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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,426	01/07/2002	Hongjie Dai	STFD.021C1 (S98-049A)	5728

7590 05/27/2003

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EXAMINER	
MARKHAM, WESLEY D	
ART UNIT	**PAPER NUMBER**
1762	7

DATE MAILED: 05/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/042,426	DAI ET AL.	
	Examin r	Art Unit	
	Wesley D Markham	1762	

-- Th MAILING DATE of this communication app ars on the cover sh t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/7/02, 11/25/02, and 3/19/03* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-70* is/are pending in the application.

4a) Of the above claim(s) *38-69* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-37 and 70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2 and 4* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of applicant's (1) preliminary amendment A, filed as paper #3 on 1/7/2002, in which continuity data referring to U.S. Application Serial No. 09/133,948 was inserted, (2) preliminary amendment B, filed as paper #5 on 11/25/2002, in which Claim 37 was added, and (3) preliminary amendment C, filed as paper #6 on 3/19/2003, in which Claims 1 – 26 were canceled, Claim 37 was amended, and Claims 38 – 70 were added. Claims 27 – 70 are currently pending in U.S. Application Serial No. 10/042,426, and an Office Action on the merits follows.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

    I. Claims 27 – 37 and 70, drawn to a method for manufacturing a carbon nanotube device, classified in class 427, subclass 249.1.

    II. Claims 38 – 69, drawn to a system for manufacturing a carbon nanotube device, classified in class 118, subclass 715+.

3. The inventions are distinct, each from the other because of the following reasons: Inventions I and II are related as process and apparatus for its practice, respectively. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to

practice another and materially different process, such as a process of depositing a material other than a carbon nanotube (e.g., other forms of carbon such as a fullerene / buckyball, graphite, amorphous carbon, etc.).

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and recognized divergent subject matter, restriction for examination purposes as indicated is proper.

5. Per the applicant's instructions in the "Remarks" section filed along with preliminary amendment C on 3/19/2003, a provisional election was made with traverse to prosecute the invention of Group I, Claims 27 – 37 and 70. Affirmation of this election must be made by applicant in replying to this Office Action. Claims 38 – 69 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

7. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

8. The later-filed application (i.e., 10/042,426) must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application); the disclosure of the invention in the parent application (i.e., 09/133,948) and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994). In other words, the disclosure presented in the continuation must be the same as that of the original application (see MPEP 201.07). This is not the case when comparing 10/042,426 (i.e., the continuation application) and 09/133,948 (i.e., the parent application). For example, the information presented in "Field of the Invention" and "Background" sections of 10/042,426 has been significantly changed from the parent application. The paragraph discussing the furnace chamber presented on page 8, line 21, through page 9, line 5, of the specification of 10/042,426 was not present in the parent application. The discussion of the selection of the distance across the etched substrate presented on page 13, lines 8 – 10, of the specification of 10/042,426 was not present in the parent application. The discussion of the undesirable nature of nanotube bundles in certain applications presented on Col.4, lines 52 – 55 of USPN 6,346,189 B1 (i.e., the patent issuing from the parent application) has been omitted from the specification of 10/042,426. These are simply examples of the substantive differences between 09/133,948 and 10/042,426, as the entire specification of 10/042,426 appears to have been rewritten.

Information Disclosure Statement

9. Acknowledgement is made of the IDSs (2) filed by the applicant as paper #2 on 5/23/2002 and paper #4 on 8/8/2002. The references listed thereon have been considered by the examiner as indicated on the attached copies of the PTO-1449 forms.

Drawings

10. The six (6) sheets of formal drawings submitted on 1/7/2002 are approved by the examiner.

Specification

11. Applicant is reminded of the proper content of an abstract of the disclosure. A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative. The abstract

should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

(1) if a machine or apparatus, its organization and operation;

(2) if an article, its method of making;

(3) if a chemical compound, its identity and use;

(4) if a mixture, its ingredients;

(5) if a process, the steps.

In this case, the abstract should refer to and describe a method and apparatus for manufacturing a carbon nanotube device (i.e., the claimed invention).

12. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "Method and Apparatus for Making Carbon Nanotube Structures Using Catalyst Islands".

13. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification does not provide proper antecedent basis for Claims 34 and 35 (filed on 1/7/2002 along with the instant application), which require reacting the carbon-containing gas with a catalyst prior to contacting the catalyst island with the carbon-containing gas. Please note that 09/133,948 does not disclose or describe reacting the carbon-containing gas with a catalyst

prior to contacting the catalyst island with the carbon-containing gas, as claimed in Claims 34 and 35 of the instant application.

Claim Rejections - 35 USC § 112

14. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

15. Claims 37 and 70 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the combination of steps presented in Claim 37 (i.e., (1) forming a layer of conductive material on an insulative substrate, (2) etching a trench in the layer of conductive material and exposing the insulative substrate at the bottom of the trench, (3) forming a catalyst material on portions of the layer of conductive material at opposing sides of the trench, and (4) heating the substrate while introducing a carbon feedstock gas to the catalyst material and growing an aligned carbon nanotube extending from the catalyst material and across the trench) and Claim 70 (i.e., further etching a trench in the exposed insulative substrate) was not described in the specification as originally filed. Since Claims 37 and 70 were introduced in

preliminary amendment C (filed on 3/19/2003, after the filing of the instant application), the claims do not comply with the written description requirement.

16. Claim 28 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, Claim 28 requires disposing the catalyst particle on the free end of a cantilever by contacting the free end of the cantilever to a particle of oxide disposed on an electrically conductive substrate, and applying an electric field between the free end and the substrate and reacting the oxide to form a catalyst. However, the applicant's specification only describes forming small particles of $Fe(NO_3)_3$ (i.e., a nitrate, not an oxide) on a gold film, contacting an AFM tip with the particle of $Fe(NO_3)_3$, applying an electric field between the tip and the gold film to adhere the $Fe(NO_3)_3$ particle to the tip, and decomposing the $Fe(NO_3)_3$ into a Fe_2O_3 catalyst particle. In other words, the applicant's specification only describes contacting the free end of the cantilever to a particle of iron nitrate disposed on an electrically conductive substrate, and applying an electric field between the free end and the substrate and reacting the nitrate to form a iron oxide catalyst. As such, one skilled in the art would not be enabled to use the claimed invention (e.g., how would one react the claimed oxide particle to form a catalyst, as the applicant's

specification only describes reacting a nitrate particle to form an oxide catalyst particle?).

17. The examiner notes that the transitional phrase "includes" recited in Claims 30, 31, 33, 34, and 36 has been reasonably interpreted by the examiner to be equivalent to "comprises" (i.e., to be "open" language).

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

19. Claims 29 – 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Li et al. ("Large-Scale Synthesis of Aligned Carbon Nanotubes", 1996).

20. Regarding independent Claim 29 (from which Claims 30 – 32 depend), Li et al. teaches a method for manufacturing a carbon nanotube device (Abstract), the method comprising forming a catalytic particle embedded in the pores of a silica network (i.e., forming an island of catalyst material) (page 2, second full paragraph),

and contacting the catalytic particle / island with a carbon containing gas and forming a nanotube extending from the catalyst particle / island (Figures 1, 2, and 4, page 2, second full paragraph, page 3, and page 4, second full paragraph). Regarding Claim 30, Li et al. also teaches forming the island of catalyst material on a top surface of a substrate (Figure 4 and associated description of the exposed iron nanoparticles marked "C", and page 4, second full paragraph). Regarding Claim 31, Li et al. also teaches contacting the catalyst island with the carbon-containing gas for a period of time sufficient to form carbon nanotubes (page 2, second full paragraph). Regarding Claim 32, Li et al. also teaches heating the catalyst material, prior to contacting the catalyst island with a carbon-containing gas (i.e., reducing the iron oxide nanoparticles at 550° C in H_2/N_2 for 5 hours prior to flowing the carbon-containing gas and growing the nanotubes – see page 2, second full paragraph).

21. Claims 29 – 31, 34, and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Kennel (USPN 6,156,256).

22. Regarding independent Claim 29 (from which Claims 30, 31, 34, and 35 depend), Kennel teaches a method for manufacturing a carbon nanotube device (Abstract and Col.1, lines 5 – 8), the method comprising forming particles of a solid catalyst material on a substrate (i.e., an island of catalyst material) (Col.3, lines 43 – 46, and Col.5, lines 27 – 37), and contacting the supported catalyst particles / islands with a carbon-containing gas and forming a carbon nanotube extending from the catalyst

particles / islands (Col.1, lines 60 – 65, Col.3, lines 25 – 67, and Col.4, lines 1 – 12). Please note that the gaseous, carbon-based plasma taught by Kennel has been broadly but reasonably interpreted to be a "carbon-containing gas" as required by the applicant's claims. Regarding Claim 30, Kennel also teaches that the solid catalytic particles are placed on a substrate which is then positioned within a reactor (Col.5, lines 27 – 37). In other words, the islands of catalyst material are placed on a "top surface" (i.e., any surface, depending on the point of view of the observer) of a substrate, as required by Claim 30. Regarding Claim 31, Kennel also teaches contacting the carbon-containing gas to the catalyst islands for a period of time sufficient to form carbon nanotubes (Col.3, lines 33 – 67, and Col.5, lines 56 – 67). Regarding Claims 34 and 35, Kennel also teaches mixing the carbon-containing gas with a growth catalyst gas such as ammonia and forming a plasma containing reactive species from the gases prior to contacting the catalyst islands with the carbon-containing gas / plasma and growing the carbon nanotubes (i.e., pre-reacting the carbon-containing gas with a reactive growth catalyst gas such as ammonia) (Figure 3, Col.2, lines 16 – 32, Col.4, lines 30 – 37, Col.5, lines 56 – 67, and Col.6, lines 1 – 4).

23. Claims 29 – 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu et al. (USPN 5,872,422).

24. Regarding independent Claim 29 (from which Claims 30 – 32 depend), Xu et al. teaches a method for manufacturing a carbon nanotube device (Col.3, lines 49 –

65, and Col.9, lines 31 – 54), the method comprising forming an island of catalyst material (Col.3, lines 58 – 62, Col.7, lines 34 – 67, and Col.8, lines 1 – 44), and contacting the catalyst islands with a carbon-containing gas and forming a carbon nanotube extending from the catalyst islands (Col.8, lines 45 – 58 and 64 – 67, Col.9, lines 1 – 65, and Col.11, lines 3 – 14). Please note that the carbon fibers taught by Xu et al. include single-wall or multiple-walled tubular structures that have diameters in the nanometer range (i.e., they are carbon nanotubes) (Col.9, lines 31 – 54). Regarding Claim 30, Xu et al. also teaches forming the island of catalyst material on a top surface of a substrate (Col.7, lines 41 – 67, Col.8, lines 1 – 44, and Figures 3D, 4D, 5D, etc., which show carbon nanotubes growing upward from the top surface of a substrate having islands of catalyst material disposed thereon). Regarding Claim 31, Xu et al. also teaches contacting the carbon-containing gas to the catalyst islands for a period of time sufficient to form carbon nanotubes (Col.8, lines 45 – 58, and Col.9, lines 8 – 16). Regarding Claim 32, Xu et al. also teaches heating the catalyst material, prior to contacting the catalyst island with a carbon-containing gas (Col.8, lines 27 – 44).

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

27. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al. (USPN 5,872,422) in view of Kennel (USPN 6,156,256).

28. Xu et al. teaches all the limitations of Claims 34 and 35 as set forth above in paragraph 24, except for a method that includes reacting the carbon-containing gas with a catalyst prior to contacting the catalyst island with the carbon-containing gas and forming a carbon nanotube. However, Xu et al. does teach a desire to grow carbon nanotubes having a range of diameters (Col.9, lines 44 – 54). Kennel teaches that the diameter of carbon nanotubes grown in a CVD process (i.e., a process analogous to that of Xu et al.) can be controlled by mixing the carbon-containing gas with a growth catalyst gas such as ammonia prior to contacting the catalyst islands with the carbon-containing gas and growing the carbon nanotubes (i.e., pre-reacting the carbon-containing gas with a reactive growth catalyst gas such as ammonia) (Figure 3, Col.2, lines 16 – 32, Col.4, lines 30 – 37, Col.5, lines

56 – 67, and Col.6, lines 1 – 4). Therefore, it would have been obvious to one of ordinary skill in the art to mix and pre-react the carbon-containing gas of Xu et al. with a growth catalyst gas such as ammonia prior to contacting the catalyst islands with the carbon-containing gas and growing the carbon nanotubes with the reasonable expectation of successfully and advantageously increasing the growth rate of the carbon nanotubes of Xu et al. and obtaining carbon nanotubes with a diameter desired by the purveyor in the art, depending on the desired application.

29. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al. (USPN 5,872,422) in view of Samsung (EP 1 134 304 A2).

30. Xu et al. teaches all the limitations of Claims 34 and 35 as set forth above in paragraph 24, except for a method that includes reacting the carbon-containing gas with a catalyst prior to contacting the catalyst island with the carbon-containing gas and forming a carbon nanotube. However, Xu et al. does teach that the substrate supporting the catalyst and from which the carbon nanotubes are grown can be silica or alumina (Col.7, lines 41 – 58). Further, Xu et al. is concerned with a high carbon nanotube growth temperature and its effect on the structural integrity of the device (Col.9, lines 1 – 7). Samsung teaches that the growth temperature of carbon nanotubes in a CVD process can be advantageously reduced by pre-reacting the carbon-containing gas with a catalytic mesh that is made of Ni, Fe, Co, etc. prior to contacting the carbon-containing gas with a catalytic substrate and growing the carbon nanotubes (Abstract, paragraphs [0008], [0009], [0015], [0016], and [0018]).

Therefore, it would have been obvious to one of ordinary skill in the art to react the carbon-containing gas of Xu et al. with a catalyst (i.e., a catalytic mesh) prior to contacting the catalyst island with the carbon-containing gas and forming a carbon nanotube in order to advantageously reduce the growth temperature of the carbon nanotubes and alleviate Xu et al.'s concern about a high carbon nanotube growth temperature negatively affecting the structural integrity of the device. Please note that Samsung has a publication/effective date of 9/19/2001, which is before the filing of the instant application but after the filing of parent application 09/133,948. However, as noted above in paragraph 13, Claims 34 and 35 do not have support in parent application 09/133,948 and therefore do not receive the benefit of the filing date of the parent application.

31. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al. (USPN 5,872,422).

32. Xu et al. teaches all the limitations of Claim 36 as set forth above in paragraph 24 and below, except for a method wherein the step of depositing an iron salt on a substrate and decomposing the iron salt is performed without mixing the iron salt with nanoparticles. Please note that Xu et al. does teach forming the island of catalyst material by depositing an iron salt on a substrate and decomposing the iron salt (Col.8, lines 27 – 44). Additionally, Xu et al. makes no mention at all of mixing the iron salt with any nanoparticles during the depositing and decomposing steps. As such, it would have been obvious to one of ordinary skill in the art to perform the

iron salt deposition and decomposition steps of Xu et al. without mixing the iron salt with any nanoparticles with the reasonable expectation of (1) success, as Xu et al. makes no mention at all of mixing the iron salt with nanoparticles during the depositing and decomposing steps, and (2) obtaining the benefit of performing the iron salt depositing and decomposing process as simply and easily as possible (i.e., without adding an unnecessary step of mixing the iron salt with nanoparticles).

Double Patenting

33. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

34. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

35. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

36. Claims 27 – 33 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 38 – 40 and 42 of U.S. Patent No. 6,346,189. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 38 – 40 and 42 of USPN 6,346,189 teach each and every process step and limitation of Claims 27 – 33 of the instant application, as well as teaching additional limitations such as the cantilever being suitable for use in atomic force microscopy. As such, it would have been obvious to one of ordinary skill in the art to perform the process of Claims 27 – 33 of the instant application in view of Claims 38 – 40 and 42 of USPN 6,346,189 because, in carrying out the process of Claims 38 – 40 and 42 of USPN 6,346,189, the process of Claims 27 – 33 of the instant application would have been carried out as well.

37. Claims 27, 29 – 31, 33, 37, and 70 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 16, 17, and 23 of copending Application No. 10/233,320. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 16, 17, and 23 of copending Application No. 10/233,320 teach

each and every process step and limitation of Claims 27, 29 – 31, 33, 37, and 70 of the instant application, as well as teaching additional limitations. As such, it would have been obvious to one of ordinary skill in the art to perform the process of Claims 27, 29 – 31, 33, 37, and 70 of the instant application in view of Claims 16, 17, and 23 of copending Application No. 10/233,320 because, in carrying out the process of Claims 16, 17, and 23 of copending Application No. 10/233,320, the process of Claims 27, 29 – 31, 33, 37, and 70 of the instant application would have been carried out as well. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

38. Claims 27 and 29 – 35 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 17 – 23 of copending Application No. 10/285,304. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 17 – 23 of copending Application No. 10/285,304 teach each and every process step and limitation of Claims 27 and 29 – 35 of the instant application, as well as teaching additional limitations. As such, it would have been obvious to one of ordinary skill in the art to perform the process of Claims 27 and 29 – 35 of the instant application in view of Claims 17 – 23 of copending Application No. 10/285,304 because, in carrying out the process of Claims 17 – 23 of copending Application No. 10/285,304, the process of Claims 27 and 29 – 35 of the instant application would have been carried out as well. This is a provisional obviousness-

type double patenting rejection because the conflicting claims have not in fact been patented.

39. Claims 29 – 31 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 9 – 11 and 22 of copending Application No. 10/299,945. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 9 – 11 and 22 of copending Application No. 10/299,945 teach each and every process step and limitation of Claims 29 – 31 of the instant application, as well as teaching additional limitations. As such, it would have been obvious to one of ordinary skill in the art to perform the process of Claims 29 – 31 of the instant application in view of Claims 9 – 11 and 22 of copending Application No. 10/299,945 because, in carrying out the process of Claims 9 – 11 and 22 of copending Application No. 10/299,945, the process of Claims 29 – 31 of the instant application would have been carried out as well. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

40. (1) Claims 27, 29 – 31, 33, 37, and 70 are directed to an invention not patentably distinct from Claims 16, 17, and 23 of commonly assigned 10/233,320 for the reasons set forth above in paragraph 37; (2) Claims 27 and 29 – 35 are directed to an invention not patentably distinct from Claims 17 – 23 of commonly assigned 10/285,304 for the reasons set forth above in paragraph 38; and (3) Claims 29 – 31

are directed to an invention not patentably distinct from Claims 9 – 11 and 22 of commonly assigned 10/299,945 for the reasons set forth above in paragraph 39.

41. The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP § 2302). Commonly assigned 10/233,320, 10/285,304, and 10/299,945, discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(f) or (g) and the conflicting inventions were not commonly owned at the time the invention in this application was made. In order for the examiner to resolve this issue, the assignee is required under 35 U.S.C. 103(c) and 37 CFR 1.78(c) to either show that the conflicting inventions were commonly owned at the time the invention in this application was made or to name the prior inventor of the conflicting subject matter. Failure to comply with this requirement will result in a holding of abandonment of the application. A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications filed on or after November 29, 1999.

Conclusion

The art made of record and not relied upon is considered pertinent to applicant's disclosure. Hafner et al. ("Direct Growth of Single-Walled Carbon Nanotube Scanning

Probe Microscopy Tips", 1999) and Hafner et al. ("Growth of nanotubes for probe microscopy tips", 1999) both teach directly growing carbon nanotubes by CVD on a cantilever supporting a catalyst. Cassell et al. ("Directed Growth of Free-Standing Single-Walled Carbon Nanotubes", 1999) and Dai et al. ("Controlled Chemical Routes to Nanotube Architectures, Physics, and Devices", 1999) both teach growing carbon nanotubes by CVD across pillars having a catalyst material disposed thereon.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (703) 308-7557. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

WDM
May 22, 2003

Wesley D Markham
Examiner
Art Unit 1762

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